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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant(s):	SUZUKI, et al.	Group Art Unit:	2877
		Examiner:	Lee, Hwa S.
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		Customer No.:	27123

For: INTERFEROMETER AND INTERFERENCE MEASUREMENT METHOD

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT

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Respectfully submitted,
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Dated: June 14, 2007

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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NUMBER : 7,106,455 B2
DATED : September 12, 2006
INVENTOR(S) : Akiyoshi Suzuki, Yoshiyuki Sekine

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims:

Please replace Claims 1, 2, 4, 8, 11, 12, 16, 19-25, 30-31 and 33 with the following claims respectively:

1. An interferometer for measuring a surface shape of an optical element using an interference signal, said interferometer comprising ~~a reference wave-front generating unit for generating a reference wave front for measuring the surface shape, which is provided in a target optical path, and includes an Alvarez lens~~ a wave-front changing unit including an Alvarez lens pair, wherein a light which forms the interference signal passes the unit and said unit being able to change a wave-front of the light into plural shapes.

2. An interferometer according to claim 1, wherein said Alvarez lens pair ~~generates~~ changes a sixth-order or higher component of a moving radius of the ~~reference~~ wave-front.

4. An interferometer according to claim 1, wherein said Alvarez lens ~~generates~~ changes a fourth-order or higher component of a moving radius of the ~~reference~~ wave-front.

8. An interferometer according to claim 6, wherein said wave-front ~~generating~~ changing unit has a spherical aberration generating part.

11. An interferometer according to claim 6, wherein said wave-front changing unit includes an Alvarez lens pair.

12. An interferometer according to claim 6, wherein said ~~reference~~ wave-front ~~generating~~ changing unit includes:

a mobile part that may variably change the wave-font; and

a monitor part for monitoring positional information of said mobile part.

16. An interference measurement method for measuring a surface shape of an optical element using an interference signal, said method comprising the steps of:

changing a wave-front of a light which forms the interferences signal by using a wave-front changing unit for variably changing a fourth-order or higher component of a moving radius of the wave-front;

detecting the ~~interferene~~ interference signal caused by light which passed the optical element; and

measuring the surface shape of the optical element on the basis of the detected interference signal.

19. An exposure apparatus using an optical element manufactured by using an interferometer for measuring a surface shape of an optical element using an interference signal, the interferometer comprising a a wave-front changing unit including an Alvarez lens pair, wherein a light which forms the interference signal passes the unit and said unit being able to ~~ch;ange~~ change a wave-front of the light into a plural shapes.

20. An exposure apparatus using an optical element manufactured by using an interferometer for measuring a surface shape of an optical element using an interference signal, the interferometer comprising a wave-front changing unit, wherein a light which forms the interference signal passes the unit and said unit ~~varibly~~ variably changing a fourth- order or higher component of a moving radius of the wave-front of the light.

21. An exposure apparatus using an optical element manufactured by using an interference measurement method for measuring a surface shape of an optical element using an interference signal, the method comprising the steps of changing a wave-front of a light which forms the interference signal by using a wave-front changing unit including an Alvarez lens pair, detecting the interference signal caused by light which passed the optical element, and measuring the surface shape of the optical element on the basis of the detected interference ~~element~~ signal.

22. An exposure apparatus using an optical element manufactured by using an interference measurement method for measuring a surface shape of an optical element using an interference signal, the method comprising the steps of changing a wave-front of a light which forms the interference signal by using a wave-front changing unit for variably generating a fourth-order or higher component of a moving radius of the wave-front, detecting the interference signal caused by light which passed the optical element, and measuring the surface shape by interfering of the optical element on the basis of the detected interference signal.

23. An interferometer for measuring surface information of a target surface by interfering a wave-front a reference mirror with a target wave-front from the target surface, [and] said interferometer comprising a wave-front changing unit for changing a wave-front of the light causing interference, wherein said wave-front changing unit comprising: a spherical aberration generating part for variably generating a spherical aberration; and an Alvarez lens pair for variably changing a component of six or higher power of moving radius of the wave-front.

24. An interference measurement method for measuring a surface shape of an optical element using interference, said method comprising the steps of:

dividing a measurement surface of the optical element into at least two segments;

interference-measuring each segment, wherein in measuring a surface shape, a wave-front for measurement of at least one segment is an ~~shape, a wave-front for a measurement of at least~~

~~one segment is an~~ aspheric wave-front and

an aspheric wave-front changing part approximately independently controllably forming each for fourth-order or higher components of a moving radius of the wave- front in the aspheric wave-front.

25. A method according to claim 24, further comprising a step of:

approximately independently ~~controllably~~ controlling, in the aspheric wave-front each of fourth-order or higher components of a moving radius of the wave-front; and

controlling curvature of a spherical component for each segment to be measured.

30. An interference measurement ~~metho~~ method for measuring a surface shape on an optical element using interference, said method comprising the steps of:

dividing a measurement surface of the optical ~~elment~~ element into at least two segments; and

interference-measuring each segment,

wherein in measuring a surface shape, the measurement surface is divided into a plurality of segments according to a distance from an optical axis, and a wave-front for a measurement of at lest one segment is an aspheric wave-front, and

wherein the aspheric wave-front is approximately independently controlled in fourth order or higher components in a moving radius of the wave-front.

31. A method according to ~~cliam~~ claim 30, wherein spherical components in the aspheric wave-front are different for each divided segment, an offset amount between the aspheric wave-front and a target surface in each segment does not exceed 10 times wavelength of light used for the ~~measurment~~ measurement.

33. An exposure apparatus using an optical element manufactured by using an interference measurement method for measuring a surface shape of an optical element using interference, said method comprising the steps of:

dividing a measurement surface of the optical element into at least two segments, and interference-measuring each segment,

wherein in measuring a surface ~~shaper~~ shape, a wave-front, for a measurement of at least one segment is an aspheric wave-front, and an aspheric wave-front ~~from~~ changing part approximately independently controllably forming each of fourth-order or higher components of a moving radius of the wave-front in the aspheric wave-front.

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